

CLAIMS (amended under PCT Article 34)

1.(amended) A method for operating a polymer electrolyte fuel cell comprising, a pair of electrodes sandwiching a polymer electrolyte membrane, a conductive separator, a means for supplying and discharging a fuel gas and an oxidizing gas to and from said electrodes, a moisturizing means for said fuel gas and/or said oxidizing gas, and a means for circulating cooling water in a plane direction parallel to said electrodes, said method comprising the steps of:

measuring at least one physical quantity selected from the group consisting of a gas flow rate of said fuel gas, a gas flow rate of said oxidizing gas, a saturated steam pressure in said fuel gas, a steam pressure in said fuel gas, a saturated steam pressure in said oxidizing gas, a steam pressure in said oxidizing gas, a temperature of said electrode and an output current value;

regulating at least one physical quantity selected from the group consisting of a flow direction of said cooling water, a temperature of said cooling water, a flow amount of said cooling water, a supply amount of said fuel gas, a supply amount of said oxidizing gas, a moisture amount in said fuel gas, a moisture amount in said oxidizing gas, a temperature of said electrode, a temperature distribution of said electrode and an output current value; and thereby

maintaining a property value Y calculated by the

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formula (1):

$$\mathbf{Y} = \mathbf{V}^m \times (\Delta \mathbf{P})^n \quad (1)$$

wherein V indicates a flow rate (m/sec) of said fuel gas or said oxidizing gas, ΔP is the difference (kgf/m²) between a saturated steam pressure and a steam pressure in said fuel gas or said oxidizing gas and $1 \leq m \leq 2$ and $1 \leq n \leq 2$ are satisfied, to 2×10^3 to 1.4×10^8 .

2. The method for operating polymer electrolyte fuel cell in accordance with claim 1, wherein an outlet of said fuel gas and said oxidizing gas in said polymer electrolyte fuel cell is made substantially open to an ordinary pressure excluding an inevitable pressure loss of a heat exchanger or a total enthalpy heat exchanger provided at the rear stage of said outlet.

3.

4.(amended) The method for operating polymer electrolyte fuel cell in accordance with claim 3, wherein at least one selected from the group consisting of m and n is regulated depending on an operating duration of time or output characteristics of said polymer electrolyte fuel cell.

5. The method for operating polymer electrolyte fuel cell in accordance with claim 1, wherein a temperature of an electrode starting point is made lower than a temperature of an electrode outlet point in said electrodes, said electrode starting point being a portion into which said fuel gas or said oxidizing gas is introduced and said electrode outlet

point being a portion from which said fuel gas or said oxidizing gas is discharged.

6. The method for operating polymer electrolyte fuel cell in accordance with claim 5, wherein a temperature of said electrode from said electrode starting point to said electrode outlet point is changed against a distance from said electrode starting point to said electrode outlet point according to a curve opening downwards.

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